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Search History

DATE: Wednesday, November 19, 2003 [Printable Copy](#) [Create Case](#)

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<u>L27</u>	L26 and emulsion	8	<u>L27</u>
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<u>L25</u>	4693755.pn.	1	<u>L25</u>
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<i>DB=USPT; PLUR=YES; OP=OR</i>			
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END OF SEARCH HISTORY

WEST☐ **Generate Collection** **Print**

L35: Entry 5 of 8

File: USPT

May 4, 1993

DOCUMENT-IDENTIFIER: US 5207877 A
TITLE: Methods for purification of air

Abstract Text (1):

Air polluted with potentially harmful chemical and biological matter is purified and pollutants degraded to less hazardous substances by a combined chemical and electrochemical process. Scrubber liquid-electrolyte circulated between scrubber and electrolyzer zones containing an electrochemically renewable degradant complexes or oxidizes the pollutants with the aid of an electrochemical cell in the electrolyzer zone which also reactivates the degradant in the scrubber liquid for recycling. Adsorption of insoluble organics is enhanced by stable surfactant additives to the scrubber liquid-electrolyte. Surprisingly, the electrochemical cell performs efficiently without separators or membranes when the non-working cathodes comprise Magneli phase substoichiometric titanium oxides which preferentially generate hydrogen instead of reducing redox couples to their inactive lower valence state.

Parent Case Text (7):

Absorption of toxic gases by water or aqueous solution, such as HCl, HF, NH₃, Cl₂, H₂S, amines, etc., can be very effective. Likewise, many of these gases, as well as microorganisms, can be removed effectively by adsorption onto solid surfaces, particularly activated carbon. Absorption, adsorption, filtration, coagulation and electrostatic precipitation are physical methods of decontamination. Physical methods are of special interest where recovery of chemicals is desirable economically.

Parent Case Text (10):

In an effort to overcome some of the shortcomings previously noted, electrochemical methods have been tried. For example, U.S. Pat. No. 3,725,226 (Stoner) describes an electrochemical device with graphite electrodes. Pathogens in water are destroyed by periodically reversing DC current. Stoner fails to address the problems associated with air purification, including means for removing harmful substances from air like organic chemicals and their destruction. French Patent 1,538,901 (Marzluff et al) teaches air purification means capable of destroying a wide range of volatile chemicals, including aldehydes, alcohols, esters and others. Metal oxide anodes, such as lead dioxide and porous air cathodes containing carbon are employed in an electrochemical cell separated by glass wool impregnated with sulfuric acid. Both the Stoner and Marzluff et al patents fail to disclose an effective method for scrubbing toxic airborne substances from air. Moreover, Marzluff et al's electrochemical cell requires the airborne components contact the electrode before destruction of the pollutant can occur placing a severe limitation on mass transport on their apparatus and rate of degradation, especially for contaminants present in air at lower, but still dangerous levels of concentration. Marzluff et al do not utilize a regeneratable electrolyte for further chemical reaction with pollutants.

Parent Case Text (13):

U.S. Pat. Nos. 3,975,246 and 4,048,044 (Eibl et al) disclose electrochemical means for purifying water contaminated with microorganisms. In the later patent, water is disinfected by an oxidation process at the anode without disinfectant additives. The former patent also relies on anodic disinfection, but also requires chloride, hydroxide, carbonate, etc., in the cathode compartment in concentrations exceeding those in the treated water. Both Eibl et al patent rely principally on electrochemical means for disinfection, and consequently, the scope of contaminants and toxic substances which can be destroyed is limited.

Brief Summary Text (4):

The nonvolatile pollutant solubilizing agent is preferably a substance which is at least partially soluble, but may be an insoluble oil or a solid adsorbent in the scrubber liquid-electrolyte and is stable to electrolysis and chemical oxidation reactions.

Brief Summary Text (8):

Accordingly, it is a further principal object to provide a method for purification of air and destruction of pollutants by the steps of: (a) providing an air purification system having a scrubber zone in combination with an electrolyzer zone. A scrubber liquid-electrolyte circulates between the electrolyzer and scrubber zones and includes an "electrochemically regeneratable degradant". Preferably, the electrolyzer zone is an undivided electrochemical cell having an anode as a working electrode and a cathode comprising a substoichiometric titanium oxide as the non-working counter electrode. The performance of the counter electrode may be characterized as suitable for preferentially generating hydrogen by electrolysis of water while desirably minimizing reduction of the electrochemically regeneratable degradant. (b) The air is cleaned by sorption of the pollutants(s) by the scrubber liquid electrolyte which pollutant are then degraded to substances of lesser toxicity by chemical reaction with the electrochemically regeneratable degradant and/or by electrochemical means at the anode. This is achieved by impressing a voltage across the electrochemical cell. (c) The process thus includes the step of converting the pollutants removed from the air to less hazardous substances. (d) In conducting the purification process the electrochemically regeneratable degradant is renewed/reactivated electrochemically at the working electrode and recycled back to the scrubber zone for further cleaning of air and destruction of pollutants with minimal reduction of the reactivated degradant occurring at the counter electrode.

Brief Summary Text (9):

For purposes of the present invention the expression "electrochemically regeneratable degradant" is intended to mean ions, either metals or nonmetals, which when in an active state are capable of forming soluble complexes with pollutants sorbed by the scrubber liquid-electrolyte which can then be destroyed/degraded electrochemically to substances of lesser toxicity or hazard, e.g. carbon dioxide and water, in the electrolyzer zone. The ions in this first group which perform by this mechanism are generally referred to herein as "complexing metal ions".

Brief Summary Text (19):

As a further alternative embodiment this invention contemplates processes which may optionally include pretreatment of contaminated gases before cleaning in the scrubber zone. They include treating the contaminated air in a prefilter zone for removing macroparticles like dust and flyash. A further optional pretreatment step includes a prescrubber zone for adsorbing larger instantaneous releases of toxic, hazardous or contaminating substances, particularly those exhibiting low water solubility. A still further option is a post treatment zone for fresh water-rinsing of the air leaving the electrolyzer zone, as well as reducing moisture content as final treatment steps before discharging the purified air or gas.

Detailed Description Text (4):

As illustrated, scrubber liquid-electrolyte 16 in a nonintegral system may preferably be circulated in a loop forming a --closed system--from the anode compartment of cell 10 to the wet scrubber zone where the polluted air is cleaned and chemical and biological contaminants dissolved into the liquid, may be further broken down to products of substantially lesser toxicity or hazard, like carbon dioxide and water. The scrubber liquid-electrolyte provides an effective solubilizing and/or chemically reactive solution or reagent for efficient removal of contaminants from the gaseous phase. Further, the scrubber liquid-electrolyte serves as an efficient reservoir for collection of both unreacted, but more often at least partially reacted contaminants, which are continually degraded or destroyed in the electrolyzer zone to form substances of lesser toxicity or hazard. Where chemical reaction of the active state of the degradant with the contaminant has occurred, the "inactive" state of the degradant is generated, but this "inactive" state is reconverted to the active form at the anode in the electrolyzer zone.

Detailed Description Text (12):

Pollutant solubilizing agent is intended to include the following classes of materials: surfactants, nonpolar solvents and hydrocarbon oils and adsorption agents. Virtually any surfactant may be employed provided it is at least partially soluble in the scrubber liquid-electrolyte, has solubility for the pollutant, and is stable to electrolysis and chemical reactions, like oxidation reactions. Suitable surfactants include members from all categories of surface active agents, including cationic, anionic, nonionic and amphoteric types. Representative anionic surfactants typically include the sulfonic acid types, like dodecylbenzene-sulfonic acid; phosphonic acid types, like long chain hydrocarbon phosphonic acids; carboxylic acid types, such as perfluoroheptanoic acids and fluorocarbon type surfactants, such as those available from DuPont under the registered trademark Zonyl. Zonyl brand surfactants as a class of materials have perfluorohydrocarbon moieties with polar end groups. Zonyl FSC cationic type surfactant is a quaternary ammonium type. Other suitable cationic type surfactants also include quaternary ammonium salts like cetyltrimethylammonium sulfate, as well as saturated aliphatic types like (CH.sub.3).sub.4 NBr, (C.sub.4 H.sub.9)NBF.sub.4 and (C.sub.6 H.sub.11).sub.4 NClO.sub.4. Fluorocarbon type surfactants as a class are particularly preferred because of their generally high degree of stability to chemical and electrochemical reactions.

Detailed Description Text (13):

Zonyl UR and FSP brand perfluorocarbon surface active agents with phosphonate end groups and Zonyl TBS with sulfonic acid end groups are further examples of the anionic type. Representative nonionic type surfactants include Zonyl FSN which has perfluorohydrocarbon chains linked to polyethylene oxide groups. Suitable amphoteric type surface active agents would consist of tetrabutylammonium perfluoroheptanoate and Zonyl FSK type surfactants which consists of quaternary ammonium and carboxylic acid perfluorohydrocarbon type surfactants. The surfactants need only be employed in amounts sufficient to help solubilize the pollutants and improve absorption of potentially toxic substances by the scrubber liquid-electrolyte. This means adding at least 0.001 percent by weight to the scrubber liquid. In the case of the fluorinated surfactants, this would include amounts ranging generally from about 0.001 to about 0.1 percent by weight.

Detailed Description Text (14):

Useful pollutant solubilizing agents which in their own right are insoluble in the aqueous liquid-electrolyte are nonpolar solvents and especially oils, such as hydrocarbon oils which are nonvolatile and stable to chemical and electrochemical attack, and capable of forming an insoluble phase with the aqueous scrubber solution. This may include higher boiling point saturated hydrocarbons and perfluorocarbons with boiling points greater than 200.degree. C. or higher. Alternatives may include saturated hydrocarbon oils alone or in combination with the above surfactants. Representative examples would consist of detergent based oils, such as motor oils having detergent type additives.

Detailed Description Text (24):

The scrubber system may optionally comprise a "dry" prefilter zone consisting of an electrostatic precipitator or a woven or porous material of the kind employed in conventional heating, air-conditioning and air-handling systems for physical removal of large airborne particles, such as flyash, carbon black, pollen, asbestos and the like. Such a prefilter is especially important when employing hollow fiber-type scrubbers to prevent blockages of the hollow fiber air inlet openings.

Detailed Description Text (27):

Since the purified air emerging from the wet scrubber may be of high humidity and have traces of aqueous electrolyte, the scrubber system also provides for an optional "post" scrubber zone, which may include a final wash with water, a demister to remove aerosol-type water particles and/or a dehumidifier to lower the humidity of the exiting purified air.

Detailed Description Text (31):

An air purifying apparatus was assembled using a commercially available plate-and-frame electrochemical cell, the MP Cell, manufactured by ElectroCell AB of Sweden. The cell consisted of a lead dioxide on lead anode (0.01 m.sup.2 in area),

DuPont Nafion^{sup}.R 324 cation exchange membrane, and a lead cathode (0.01 m.^{sup}.2 in area). The cell was connected to a DC power supply which also had attached an ammeter, voltmeter and coulometer for following the charge passed. The aqueous electrolyte of the anolyte consisted of 3 liters of 0.1M chromic acid dissolved in 3M sulfuric acid in water, and the catholyte, 3 liters of 3M aqueous sulfuric acid. The anolyte was continuously circulated by means of a March Pump (Model TE-MDX-MT-3) to the scrubber, while the catholyte was likewise continuously circulated to a reservoir. Two all-plastic flow meters were situated in these separate electrolyte streams, and by means of valves, the flow rate on each stream was adjusted to be approximately equal and about 4 liters/min. The scrubber consisted of a 3 liter cylindrical tower constructed of glass, which was partially filled with glass beads to provide a high surface contact area, and which was fitted with a thermometer and a potentiometric measurement device for monitoring the dichromate concentration level. This latter device comprised a Pt wire electrode, saturated calomel reference electrode and a high impedance digital multimeter, with the two electrodes immersed in the circulating solution. The scrubber also had provisions for introducing a contaminated air stream and for taking samples for analysis of the purified air.

Detailed Description Text (41):

A portable electrochemically-based air purifier is assembled into a gas mask, capable of removal and destruction of a broad spectrum of toxic chemical and pathogenic substances. A conventional gas mask powered by a portable battery pack and equipped with an electrical circulating system, is modified by incorporation into the air intake portion a dry scrubber element comprising activated carbon through which the air is initially drawn, followed by a wet scrubber unit incorporating microporous hollow fibers through which an aqueous electrolyte is circulated from a small electrochemical cell powered by the abovementioned battery pack. The circulating aqueous electrolyte consists of an acid solution as anolyte containing the couples Cr.^{sup}.+6 /Cr.^{sup}.+3, with Ce.^{sup}.+4 /Ce.^{sup}.+3 and additives of Cu.^{sup}.2+ as a complexing agent degradant and Ag as a catalyst. The electrochemical cell comprises a PbO.₂ on Pb anode, a DuPont Nafion^{sup}.R membrane, and an air-depolarized gas diffusion cathode in contact with a non-circulating reservoir of an aqueous electrolyte solution as catholyte. Current inefficiencies will lead to oxygen evolution by electrolysis of water. However, this is desirable especially when used with a gas mask, in which the oxygen can be utilized as a source of supplemental life supporting oxygen for inhalation.

Detailed Description Text (51):

For purposes of demonstrating the effect of pollutant solubilizing agent on the performance of the air purification process for poorly water soluble or insoluble pollutants the following experiment was conducted. 100 ml of 0.1 molar ceric sulfate was added to a 3 molar aqueous sulfuric acid solution and this was magnetically stirred at 55.degree. C. Surfactants in various concentrations were added to the above solutions. The surfactants was an anionic type available from 3M Company under the designation FC-99 and which is a perfluoroalkyl sulfonate. Pollutants with concentrations of surfactant added are provided in the table below. After reacting for two hours the extend of oxidation was determined by analyzing the remaining Ce.^{sup}.+4 in solution, titrimetrically.

Detailed Description Text (52):

The data in the table shows that toluene and p-xylene had no or relatively poor levels of destruction in those experiments performed without surfactants, and correspondingly enhanced destruction when surfactant was added to the scrubber solution.

Detailed Description Paragraph Table (2):

TABLE	Pollutant (millimoles)		Surfactant (%)	
e. ^{sup} .- /mole	None (Control)		0.10	0
(2.0) None	0	Toluene (2.1)	0.10	12
		p-xylene (1.8)	None	1.6
		p-xylene (1.9)	0.10	3.1

CLAIMS:

2. The method of claim 1 wherein said pollutant solubilizing agent is a surfactant which is at least partially soluble in said scrubber liquid-electrolyte and stable

to electrolysis and chemical oxidation reactions.

3. The method of claim 1 wherein said pollutant solubilizing agent is a member selected from the group consisting of a nonpolar solvent, a hydrocarbon oil and a solid adsorbent.

7. The method of claim 5 wherein the surfactant is a fluorinated hydrocarbon type.

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L28: Entry 2 of 5

File: DWPI

Oct 23, 1996

DERWENT-ACC-NO: 1994-111200
DERWENT-WEEK: 199929
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TITLE: Generation of liq. particles and negative ions - by generation of particles, mixing with air and sepg. particles having dia. above specific value, used for disinfecting operating theatre, etc.

INVENTOR: MIYAMOTO, K; MIYASAKA, M

PATENT-ASSIGNEE:

ASSIGNEE	CODE
IZUMI LAB CO LTD	IZUMN
IZUMI INST KKLTD	IZUMN

PRIORITY-DATA: 1992JP-0234897 (September 2, 1992)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
KR 9614994 B1	October 23, 1996		000	A61M015/02
EP 590752 A1	April 6, 1994	E	025	A61M015/02
CN 1083396 A	March 9, 1994		000	A61M011/00

DESIGNATED-STATES: DE FR GB IT

CITED-DOCUMENTS: 1.Jnl.Ref; EP 280754 ; FR 1242534 ; FR 2429045 ; FR 2654273 ; JP04141179 ; US 3232292 ; US 4369776

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
KR 9614994B1	January 25, 1993	1993KR-0000876	
EP 590752A1	February 26, 1993	1993EP-0301477	
CN 1083396A	March 3, 1993	1993CN-0102665	

INT-CL (IPC): A61M 11/00; A61M 15/00; A61M 15/02

ABSTRACTED-PUB-NO: EP 590752A
BASIC-ABSTRACT:

Liquid particles and negative ions are generated by generating (2) liquid particles from a liquid, mixing the particles with flowing air (from 3) and separating (at 4) from the flowing mixture particles which have a diameter in excess of a predetermined value.

Also claimed are methods as above in which the air is flowing at 0.5 to 50 m/sec and the predetermined diameter value is either 0.3 or 1 micron, apparatus for carrying out each of the methods described above, and a method of using liquid particles and negative ions produced by the first method claimed to disinfect a space where the liquid is a disinfecting liquid with the option of subsequently capturing disinfecting liquid particles remaining in the space by forming a mixture of water

particles, of diameter exceeding 2 microns, and air and supplying the mixture to the space.

USE/ADVANTAGE - In generating ultra fine liquid particles which can reach the pulmonary alveoli while also generating negative ions which are calming to the mind and enhance the respiratory organs; or for disinfecting a space such as an operating theatre. Provides a compact efficient arrangement for producing a beneficial combination of fine liquid particles and negative ions, which are produced when the particles are generated, and a system which can be used to disinfect an operating theatre within one hour, where previous methods have required six or more hours.

CHOSEN-DRAWING: Dwg.1/11

TITLE-TERMS: GENERATE LIQUID PARTICLE NEGATIVE ION GENERATE PARTICLE MIX AIR
SEPARATE PARTICLE DIAMETER ABOVE SPECIFIC VALUE DISINFECT OPERATE THEATRE

DERWENT-CLASS: B07 P34

CPI-CODES: B11-C03; B11-C06;

CHEMICAL-CODES:

Chemical Indexing M6 *01*
Fragmentation Code
M903 P440 P820 Q261 R013 R501 R530 R535

SECONDARY-ACC-NO:

CPI Secondary Accession Numbers: C1994-051317

Non-CPI Secondary Accession Numbers: N1994-087108

WEST**End of Result Set**☐ **Generate Collection** **Print**

L5: Entry 59 of 59

File: DWPI

Aug 19, 1997

DERWENT-ACC-NO: 1989-339427

DERWENT-WEEK: 199747

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TITLE: Aq. compsns. for preventing release of airborne asbestos particles - during removal of asbestos-contg. material from structures is dil. non-ionically stabilised latex contg. nonionic and cationic surfactants

INVENTOR: BATDORF, V H

PATENT-ASSIGNEE:

ASSIGNEE

FOSTER PROD CORP

FULLER CO H BOPR

CODE

FOSTN

FULH

PRIORITY-DATA: 1988US-0213355 (June 30, 1988)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
CA 1339293 C	August 19, 1997		000	C09K003/22
US 4866105 A	September 12, 1989		000	

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
CA 1339293C	June 28, 1989	1989CA-0604186	

INT-CL (IPC): B08B 7/00; C08K 3/34; C08L 9/00; C09K 3/22

RELATED-ACC-NO: 1991-237400;1994-176318

ABSTRACTED-PUB-NO: US 4866105A

BASIC-ABSTRACT:

Latex-based compsns. are described for wetting and encapsulating asbestos-contg. material in order to reduce the amt. of airborne asbestos generated during and after debridging of the material from a structural unit. The compsns. comprise 70-95 wt.% of water; 5-30 wt.% latex (I) stabilised with a nonionic surfactant and having solids content 45-60 wt.%, Brookfield viscosity less than 1500 cpds, and max. particle size less than 0.4 microns; sufficient nonionic surfactant (II) to reduce surface tension to less than 40 dyens/cm; and 1-5 wt.% cationic surfactant (III). Opt. also present is a defoaming agent; corrosion inhibitor; buffer to give pH 9-10; freezing point depressant (IV) (to below 10 deg.C); and dye.

(I) is a pref. styrene-butyl rubber, EVA, acrylic homopolymer or vinyl acrylic copolymer latex. Esp. pref. is a styrene rubber latex having Brookfield viscosity less than 200 gps and max. particle size less than 0.2 microns (Ia). (II) is an acetylenic glycol (IIa). (III) is a monoalkyl imidazolium ethyl sulphate (IIIa). (IV) is a lower alcohol.

USE/ADVANTAGE - The hazards associated with the use of asbestos-contg. materials in building structures in the past is well-known and calls for their removal. To assist in this, the non-thixotropic, non-toxic, odour-free compsns. can be sprayed, using conventional atomising equipment, onto the asbestos-contg. material being removed. The compsn. quickly and deeply penetrates all types of material without dripping, and efficiently encapsulates asbestos fibres in a pliable coating so as to prevent release of airborne particles during collection and disposal of the removed materials. (6pp dwg.No.0/0)

TITLE-TERMS: AQUEOUS COMPOSITION PREVENT RELEASE AIRBORNE ASBESTOS PARTICLE REMOVE ASBESTOS CONTAIN MATERIAL STRUCTURE DILUTE NON ION STABILISED LATEX CONTAIN NONIONIC CATION SURFACTANT

DERWENT-CLASS: A82 G02 L02 P43

CPI-CODES: A07-B; A12-W05; A12-W11F; G02-A05; L02-D11;

POLYMER-MULTIPUNCH-CODES-AND-KEY-SERIALS:

Key Serials: 0034 0206 0231 2273 2276 2424 2430 2440 2504 2628 2651 2674 2675 2708 2729 2837 0003 0009 0265 0307 1103 0241 3155 0789 0486 0488

Multipunch Codes: 014 032 034 037 04- 041 046 052 055 056 117 123 273 28& 318 320 324 397 431 434 436 445 477 52- 525 527 546 551 560 566 575 592 593 61- 62- 720 014 034 04- 041 046 047 066 067 27& 273 318 320 324 397 431 434 436 445 477 52- 525 527 546 551 560 566 575 592 593 61- 62- 720 014 034 04- 074 081 27& 273 318 320 324 397 431 434 436 445 477 52- 525 527 546 551 560 566 575 592 593 61- 62- 688 720

SECONDARY-ACC-NO:

CPI Secondary Accession Numbers: C1989-150480

Non-CPI Secondary Accession Numbers: N1989-258350